

**What is claimed is:**

1. A fertilizer composition comprised of decontaminated manure and Bacillus spores.
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2. The fertilizer composition of claim 1 comprising a humic acid.
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3. The fertilizer composition of claim 2 comprising an additive selected from the group consisting of N compounds, P compounds, K compounds, and combinations thereof.
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4. The fertilizer composition of claim 3 where the decontaminated manure, the Bacillus spores, the additive, and the humic acid are blended into an admixture resulting in a granular or powdered product.
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5. The fertilizer composition of claim 4 where the decontaminated manure, the Bacillus spores, the additive, and the humic acid are formed into prills or pellets.
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6. The fertilizer composition of claim 1 wherein the decontaminated manure is derived from layer chicken manure, swine manure or a combination thereof.
7. The fertilizer composition of claim 1 wherein the Bacillus spores are from strains of probiotic Bacillus bacteria capable of enhancing beneficial microbial populations within a rhizosphere of a plant.
8. The fertilizer composition of claim 2 wherein the humic acid is derived from lignite.
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9. The fertilizer composition of claim 3 where the N compound are selected from the group consisting of urea, ammonium sulfate, ammonium nitrate,

ammonium phosphate, calcium nitrate, potassium nitrate, sodium nitrate; the P compounds are selected from the group consisting of ammonium phosphate, superphosphate,  $\text{Ca}(\text{H}_2\text{PO}_4)_2$ , tricalcium phosphate, phosphate salts of sodium or potassium, including orthophosphate salts; and the K compounds are selected from the group consisting of KCl, potassium sulfate, potassium nitrate, and phosphate salts of potassium, including orthophosphate salts.

5           10. The fertilizer composition of claim 1 wherein the decontaminated manure is derived from raw manure decontaminated by pit composting and solar drying.

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11. The fertilizer composition of claim 1 wherein the decontaminated manure is derived from reaction of raw manure with concentrated mineral acid and subsequently dried.

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12. The fertilizer composition of claim 1 wherein the decontaminated manure is derived from reaction of raw manure with a hypochlorite compound and subsequently dried.

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13. The fertilizer composition of claim 1 wherein the decontaminated manure has a total aerobic/facultative viable plate count reduced by 2-4 logs (100 to 10,000 times) compared to raw manure.

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14. The fertilizer composition of claim 1 wherein the Bacillus spores are prepared in water suspension and combined with the decontaminated manure in said suspension.

15. The fertilizer composition of claim 1 wherein the Bacillus spores are present in sufficient concentration to effect a viable spore count of between  $10^6$  cfu to  $10^9$  cfu per gram of dry composition.

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16. The fertilizer composition of claim 1 wherein the Bacillus spores are derived  
from Bacillus selected from the group consisting of *Bacillus laterosporus*

(ATCC \_\_\_\_\_), *Bacillus laterosporus* (ATCC \_\_\_\_\_), *Bacillus*

*licheniformis* (ATCC \_\_\_\_\_), *Bacillus subtilis* (ATCC \_\_\_\_\_), and

mixtures thereof.

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17. The fertilizer composition of claim 16 wherein the Bacillus spores are derived  
from mixtures of two or more of *Bacillus laterosporus* (ATCC \_\_\_\_\_),

*Bacillus laterosporus* (ATCC \_\_\_\_\_), *Bacillus licheniformis*

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(ATCC \_\_\_\_\_), and *Bacillus subtilis* (ATCC \_\_\_\_\_).

18. The fertilizer composition of claim 16 wherein the Bacillus spores are derived  
from *Bacillus laterosporus* (ATCC \_\_\_\_\_).

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19. The fertilizer composition of claim 16 where the Bacillus spores are derived  
from *Bacillus laterosporus* (ATCC \_\_\_\_\_).

20. The fertilizer composition of claim 16 wherein the Bacillus spores are derived  
from *Bacillus licheniformis* (ATCC \_\_\_\_\_).

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21. The fertilizer composition of claim 16 where the Bacillus spores are derived  
from *Bacillus subtilis* (ATCC \_\_\_\_\_).

22. The fertilizer composition of claim 2 wherein the humic acid is leonardite.

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23. The fertilizer composition of claim 2 wherein the humic acid is potassium  
humate.

24. A solid fertilizer composition for plant production comprised of

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decontaminated manure, Bacillus spores, humic acid and, optionally, one or  
more N-P-K compounds.

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25. The fertilizer composition of claim 24 formulated as a complete fertilizer.

26. The fertilizer composition of claim 24 formulated as a supplemental fertilizer.

5           27. The fertilizer composition of claim 24 wherein the decontaminated manure is selected from the group consisting of decontaminated layer chicken manure, decontaminated swine manure, and mixtures thereof.

10          28. The fertilizer composition of claim 24 wherein the *Bacillus* spores are from strains of probiotic *Bacillus* bacteria capable of enhancing beneficial microbial populations within a rhizosphere of a plant.

15          29. A method of making the fertilizer composition of claim 1, the method comprising the steps of:

15           a)       treating raw manure to form a substantially decontaminated manure by a process selected from the group consisting of:

20            1) composting the raw manure in a composting process to make a partially decontaminated raw manure, and solar drying the partially decontaminated raw manure in a solar drying process to make the substantially decontaminated manure;

25           2) reacting the raw manure with concentrated mineral acid to make the partially decontaminated manure, and subsequently drying the partially decontaminated manure in a drying process to form the substantially decontaminated manure;

30           3) reacting the raw manure with a hypochlorite compound to make the partially decontaminated manure, and subsequently drying the partially decontaminated manure in a drying process to form the substantially decontaminated manure; and

30           4) combinations of these; and

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

5           b) combining the substantially decontaminated manure with a second composition comprising *Bacillus* spores to produce the fertilizer composition.

10          50. The method of claim 29 comprising a step (c) of forming the fertilizer composition into prills or pellets, and adding humic acid as a hardening agent, either in the second composition of step (b), or added during said step (c).

15          31. The method of claim 30 wherein the humic acid is selected from the group consisting of leonardite and potassium humate.

20          32. The method of claim 29 wherein the hypochlorite compound is selected from the group consisting of calcium hypochlorite, sodium hypochlorite, and mixtures thereof.

25          33. The method of claim 29 wherein the hypochlorite compound is added at about 0.5 to about 3.0 percent by weight of dry ingredients.

30          34. The method of claim 29 wherein the second composition comprising *Bacillus* spores is prepared as a water suspension prior to step (b).

35. The method of claim 29 wherein the mineral acid is selected from the group consisting of hydrochloric acid, sulfuric acid, phosphoric acid, nitric acid, and combinations and mixtures thereof.

36. The method of claim 29 wherein the mineral acid is added in sufficient quantity to reduce pH of the partially decontaminated manure below 3.0.

37. The method of claim 29 where the pit composting process runs for a period of time ranging from about 2 to about 3 years.

38. A process according to claim 29 where the solar drying process runs for a period of time long enough to render a moisture content of the substantially decontaminated manure below 20 percent.

5       39. A process according to claim 29 where the drying process of step (a)(2) is run for a time period long enough to render a moisture content of the substantially decontaminated manure below 20 percent.

10      40. A method of increasing the yield of a plant while reducing the nitrogen effect, the method comprising the steps of:

15       a) supplying to a rhizosphere of a plant a sufficient amount of a composition of the invention to increase yield without significantly increasing the nitrogen effect; and

15       b) maintaining contact between the rhizosphere of the plant and the composition for a time sufficient to enhance yield of the plant while reducing nitrogen effect.

20      41. A method of making a prilled or pelleted fertilizer product, the method comprising the steps of:

25       a) producing a substantially decontaminated manure;

      b) combining the substantially decontaminated manure of step (a) with a second composition comprising *Bacillus* spores to produce a fertilizer composition;

      c) adding humic acid from an external source to the fertilizer composition to form a modified fertilizer composition; and

      d) forming a prilled or pelleted product, under conditions of temperature and pressure suitable to produce the product.

30      42. A method of increasing concentration of beneficial non-bacillus organisms in a rhizosphere, the method comprising applying an effective amount of a composition of the invention to a rhizosphere for a time sufficient to increase

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concentration of non-bacillus beneficial organisms in the rhizosphere, the non-bacillus beneficial organisms selected from the group consisting of actinomycetes and nitrogen fixing bacteria.

5        43. An integrated method for producing a solid fertilizer and a hydrocarbon, the method comprising the steps of:

- a) producing a hydrocarbon composition from a source of hydrocarbon and using at least a portion of the hydrocarbon composition as fuel to heat (by direct or indirect contact) an air stream to create heated air;
- b) contacting (directly or indirectly) a partially decontaminated raw manure composition with a first portion of the heated air to form a substantially decontaminated manure composition;
- c) combining the substantially decontaminated manure composition with an aqueous composition comprising bacillus spores to form a wet fertilizer composition; and
- d) contacting (directly or indirectly) the wet fertilizer composition with a second portion of the heated air to form a solid fertilizer composition.

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